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14. ABSTRACT Recently, discussions concerning the weaponization of space have begun to reach a crescendo. Political and military leaders within the U.S. have started expanding the national discussion regarding this highly debated topic. This paper will not focus on the weaponization debate as a matter of policy, but rather will offer options for operational command and control of space weapons hypothetically deployed. Two broad categories are analyzed; command and control using reachback and command and control from within the theater commander's operational area. The latter is divided into two possibilities: creation of a Joint Forces Space Component Command and creation of a Joint Forces Air and Space Component Command. With doctrinal guidance as a starting point, each of these options for space strike command and control are analyzed according to their advantages and disadvantages to the operational commander. The paper concludes with a rationale for future Joint Force Commanders to create a Joint Force Space Component Command to best command and control space strike assets.					
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Towards Improved Operational Command and Control of Space Weapons

By

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A paper submitted to the Faculty of the Naval War College in partial satisfaction of the requirements of the Department of Joint Military Operations.

The contents of this paper reflect my own personal views and are not necessarily endorsed by the Naval War College or the Department of the Air Force.

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Contents

List of Illustrations	iii
Preface	iv
Abstract	v
Introduction	1
Operational Context	1
Current Doctrine	3
Current Space Command and Control	5
Future Space Command and Control	9
Joint Force Space Component Command	11
Joint Force Air and Space Component Command	13
Analytic Conclusions	14
Recommendations: The Joint Force Space Component Command	15
Summary	17
Selected Bibliography	19

List of Illustrations

Figure	Title	Page
1.	Current Structure	6
2.	JFSCC Structure	12
3.	JFASCC Structure	14

Preface

I wish to extend a special thanks to CDR J. Scott McPherson for providing the inspiration to explore this particular topic, as well as for aiding in the final organization of the paper. I would also like to recognize Majors David Learned and Troy Kimball for their review of the document and well-received critiques from a space operations perspective. Finally, I want to especially thank Col Mike Morris for his guidance throughout the process of completing this effort.

Abstract

Towards Improved Operational Command and Control of Space Weapons

Recently, discussions concerning the weaponization of space have begun to reach a crescendo. Political and military leaders within the U.S. have started expanding the national discussion regarding this highly debated topic. This paper will not focus on the weaponization debate as a matter of policy, but rather will offer options for operational command and control of space weapons hypothetically deployed. Two broad categories are analyzed; command and control using reachback and command and control from within the theater commander's operational area. The latter is divided into two possibilities: creation of a Joint Forces Space Component Command and creation of a Joint Forces Air and Space Component Command. With doctrinal guidance as a starting point, each of these options for space strike command and control are analyzed according to their advantages and disadvantages to the operational commander. The paper concludes with a rationale for future Joint Force Commanders to create a Joint Force Space Component Command to best command and control space strike assets.

INTRODUCTION

The year is 2030 and a Joint Force Commander (JFC) is planning for hostile engagement with an enemy country. As part of the operational planning process, the JFC is developing the target list and apportioning assets to strike those targets as the war commences. The largest difference, compared to previous engagements, is that the JFC has space-based assets from which to deliver strikes along with the apportioned air, land, and sea platforms. These space strike assets are seamlessly integrated with the legacy platforms, enabling destruction or neutralization of ground targets from each of these domains as the war commences.

While this scenario is clearly fictional given the year 2007 weapon platforms, it is likely to be technologically feasible in the timeframe established above.¹ Currently *not* feasible is the “seamless integration” of tasking and controlling the strike assets, including space, from a location within the theater. While the evolution of space-based weapon command and control fits within current Department of Defense doctrine, tradeoffs between reachback and in-theater command and control of space weapons, through creation of a Joint Force Space Component Command, must be made for future operational commanders to fully benefit from space weapons.

OPERATIONAL CONTEXT

It is important to note several points to put “space weapons” in the proper context for this paper. First, there is extensive debate within the U.S. as to whether space should be “weaponized” at all. While not discounting the value of these debates, the assumption is made here that space will be weaponized, with on-orbit capability to deliver effects to

(All notes appear in shortened form. For full details, see the appropriate entry in the bibliography)

¹ USAFSPC 2003, 10-24 in McPherson, *Utility Space-Based Weapons*, 8.

the ground. This space-based force application could come from hyper-kinetic munitions, directed energy technology, or space-deployed guided weapons.² The important point is that this paper assumes the U.S. has the capability to deliver destructive effects from a space-based asset to the ground.

Next, it is important to focus on what type of space asset is delivering the effect. The potential exists for space weapon use in at least three categories: Ballistic Missile Defense, a tactical satellite, and theater strike from a global asset. The analysis here focuses on the last. Space strike within Ballistic Missile Defense will probably not fall to a JFC for operational command and control, and if a JFC were to launch a tactical satellite, the assumption is that the asset would be completely owned by the JFC so no command and control questions would arise. The most difficult command and control relationship would develop from attempting to use a global asset to deliver ground strike within the JFC's Joint Operational Area (JOA). Therefore, this analysis will focus on that case.

Specific to the combat realm, the theater commander's primary concern is destruction or neutralization of a given target.³ At lower levels of command, integration of assets operating in each domain (air, land, sea, space) is required. In fact, true force multiplication to achieve asymmetric battlefield advantages, given a space-based combat capability, results from the integration of the space-based combat with ground combat.⁴

² Ibid.

³ Lambeth, *Mastering Ultimate High Ground*, 115-116. Lambeth refers to combat functions carried out through the specific domain, i.e., the commander does not care if a naval vessel, aircraft or spacecraft is delivering the munition. Of concern to the JFC might be the level of stealth an asset within the domain provides for security or surprise purposes.

⁴ Konner and Pope, *Air & Space Power Journal* 10, 18-19.

The best methods for achieving the highest degree of force multiplication using space weapons are yet to be developed.

It is important to begin this integration effort now, before the emplacement of space-based weapons. Prior to the first Gulf War, space doctrine was relatively immature, and a six-month buildup to hostilities enabled commanders to develop appropriate support relationships.⁵ Future commanders may not be afforded such planning luxury. Effective command and control needs to be developed in advance to affect efficient force multiplication from space assets. Current joint doctrine provides a starting point.

CURRENT DOCTRINE

Since no space weapons currently exist, joint doctrine can be analyzed to determine how space weapons might fit into the current space command and control architecture. Joint Publication 3-0: *Joint Operations* specifically addresses command and control of space operations. It states that a JFC should, if deemed necessary, name a coordinating authority for space to consolidate and prioritize all theater space requirements.⁶ The overall request for space support is then coordinated with the appropriate component of U.S. Strategic Command (STRATCOM) for execution. Currently, this space support includes primarily ISR, weather, navigation, communications, and ballistic missile warning support,⁷ but could be adapted to include space strike support.

Joint doctrine also suggests the delegation of as much operational control as possible to component commanders and the use of reachback. Joint Publication 3-14:

⁵ Bruger, *Not Ready for First*, 7,13.

⁶ JP 3-0, *Joint Operations*, 3-7.

⁷ 14th AF, Fact Sheet.

Joint Doctrine for Space Operations states that STRATCOM⁸ will normally maintain Operational Control (OPCON) of space forces, forces not typically deployed to the JOA.⁹ In sum, joint doctrine suggests a JFC name a Space Coordinating Authority (SCA) to gather all theater space requirements and submit the request for space support to CONUS-based units for action.

Since the Air Force is now the executive agent for “infrastructure and stewardship” of space forces,¹⁰ it is important to follow the policy-doctrine trail to Air Force doctrine. Air Force doctrine regarding space command and control echoes the joint doctrine themes and provides additional guidance for command and control. Air Force Doctrine Document 2-2: *Space Operations* reiterates that the global nature of space capabilities requires STRATCOM to retain command and control of space forces.¹¹ Also following joint doctrine, it suggests the use of an SCA in theater to gather theater requirements which are then passed to STRATCOM for prioritization.¹² This prioritization is required since space assets “may be used to fulfill single theater, multiple theater, or global objectives.”¹³ Lifecycle maintenance concerns also arise as each on-orbit asset has finite capabilities. Finally, Air Force doctrine states that the Joint Space Operations Center (JSPOC) in CONUS will use the Space Tasking Order (STO) to

⁸ JP 3-14 discusses “USSPACECOM” not “STRATCOM.” USSPACECOM no longer exists, but has been melded with AFSTRATCOM into STRATCOM. JP3-14 was written prior to the 2001 Space Commission recommending this organizational change.

⁹ JP 3-14, *Joint Operations*, 3-1.

¹⁰ McPherson, *Utility Space-Based Weapons*, 11.

¹¹ AFDD 2-2, 9.

¹² Ibid., 13. The lines between an SCA-holding JFACC and an in-theater Director of Space Forces (DIRSPACEFOR) are blurring. AFDD 2-2 discusses both (SCA and DIRSPACEFOR) in a very similar manner. Also, AF Space Command seems to be leaning towards a full-time DIRSPACEFOR in regional AOCs who would also hold SCA (see Scott, *Reshaping Stratcom*).

¹³ Ibid., 9.

conduct space operations and “fulfill theater and global mission requirements.”¹⁴ This process details the methods used to gather current theater and global space operations requirements, but could also be postulated to include future space strike requirements.

Additionally, Air Force doctrine specifically addresses future force application missions from space. Doctrine suggests that this type of space support will require “close support” requiring space forces to operate in close proximity to theater forces due to the necessity for detailed integration.¹⁵ It suggests the force application mission should be assigned to the Joint Force Air Component Commander (JFACC) in theater so that the commander can integrate all strategic attack capabilities required for the theater.¹⁶ The JFACC would also hold the SCA and “reachback” to the JSpOC to request that a portion of target strikes be accomplished from space assets. Due to this, a strong working relationship between the JFACC and the Space Component Commander (JFCC SPACE) within STRATCOM is required.¹⁷ It also states that in order to address current integration challenges, space expertise will be embedded within the JFACC.¹⁸ In this manner, Air Force doctrine puts future space strike missions within the process currently used for space command and control, while increasing space expertise within the JFACC staff to aid in integration.

CURRENT SPACE COMMAND AND CONTROL

This doctrinal backdrop provides the framework for ineffective operational command and control of space strike assets. As stated, current joint and Air Force doctrine identify reachback, using the JSpOC, as the preferred method for operational

¹⁴ Ibid., 29-30.

¹⁵ Ibid., 12.

¹⁶ Ibid., 31-32.

¹⁷ Ibid., 32.

¹⁸ Ibid., 34.

command and control of space operations, including future space strike. This structure is shown in Figure 1.

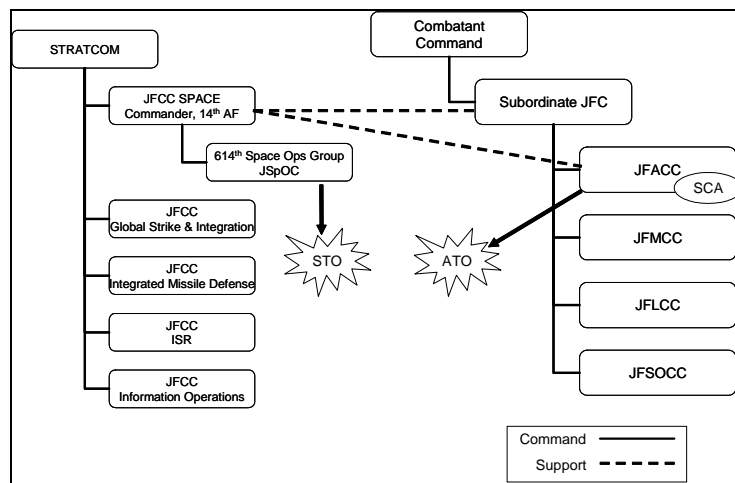


Figure 1. Current Structure¹⁹

Analysis of the advantages and disadvantages of this reachback structure will show that it prefers the global aspect of satellite capabilities over the theater commander's requirements, resulting in inadequate operational command and control.

The primary advantages for the reachback capability are unity of command, security, and use of an existing architecture. Since the JSpOC is tasked to operate the assets by aggregating all requirements into the STO, unity of command of space assets is guaranteed. It also increases the security of personnel and communication nodes performing satellite tasking and maintenance by keeping those personnel and equipment out of the JOA. Finally, this option uses existing architecture to perform the mission. Control of the additional space strike platforms could be taken on easily by existing operating locations with personnel who are familiar with space command and control. In fact, these organizations are already attempting to achieve better integration of space with

¹⁹ Basic structure for this figure derived from JP 3-14, *Joint Operations*, 3-2, with STRATCOM organizational structure derived from Scott, *Strategic Space*, and Stewart, *Unit Stands up at Vandenberg*.

air, land and sea operations through wargames.²⁰ These efforts have provided theater commanders with better information on space asset locations and taskings.²¹ A similar capability for space strike information could be developed.

From the theater commander perspective, however, there are several disadvantages to the reachback option. Some argue the existing command and control links are already too complex,²² and including an additional strike capability would only further complicate matters. In fact, they contend that the links are so disjointed that in some cases, space operators have to work with several distinct command and control systems.²³ Current operators within the JSPOC are required to make manual entries into a web site to “keep everyone aware of the space situation.”²⁴ While attempts are being made to improve the situation, it speaks to the complexity of the multiple relationships.

Effective reachback is also heavily dependent upon in-theater expertise. Whoever holds the authority over space assets must have a staff that can effectively and efficiently develop theater space requirements. Currently, this is done by infusing Air Force Space Support Teams (AFSSTs) into the JFACC staff.²⁵ During their existence, AFSSTs have proven themselves during real-world exercises and deployments in operations.²⁶ The AFSST involved with exercise KEEN EDGE in 1996 provided Pacific Air Forces “a forum to educate warfighters on capabilities of what space (could) do for them.”²⁷ More recently, an AFSST involved with Operation DESERT FOX provided near real-time

²⁰ Scott, *Milspace 2020*.

²¹ Ibid.

²² Tuttle, *Coming Together*.

²³ Ibid.

²⁴ Ibid.

²⁵ Tymofichuk, *Operationalizing and Integrating Space*, 12.

²⁶ Ibid., 27-29.

²⁷ Ibid., 28.

intelligence directly to bomber crews prior to their missions.²⁸ Despite these success stories, AFSSTs are faced with current shortfalls.

The shortfalls AFSSTs are experiencing hinder achievement of their objectives and negatively impact the JFC's ability to properly develop the operational staff. AFSSTs are experiencing manning shortfalls due to the emphasis by Numbered Air Forces and Air Force Major Commands on air-breathing capabilities.²⁹ These entities, the very ones in which the Air Force is attempting to fuse space expertise, are reluctant to convert pilot and navigator positions to space operations positions, a change which would enable the space experts to enter the organization on a long-term basis.³⁰ While AFSSTs are often present at major exercises, they are typically relegated to briefing space capabilities and limitations instead of being infused to effectively operationalize space support.³¹ Finally, the Air Force in general is reluctant to invest in the equipment required by AFSSTs to effectively perform their command and control function.³² Possibly due to these limitations, there are current moves to push command and control of satellites to the lowest levels possible.³³ The JSpOC itself wants to get to a point where it is only the "central nervous system" of space command and control so theater commanders are able to physically task satellites from any location.³⁴ Manning and equipment shortfalls may lead to future JFCs being unable to effectively pool space expertise and capability within their JFACC staff to bring space strike to bear.

²⁸ Ibid., 29.

²⁹ Ibid., 30.

³⁰ Ibid.

³¹ Ibid., 31.

³² Ibid., 32.

³³ Tuttle, *Coming Together*.

³⁴ Ibid.

Finally, there are human aspects of reachback that make it a disadvantage to the theater commander. Under this system, STRATCOM is seen as interfering in operational-level matters.³⁵ While space support is seen as critical to today's military operations, strikes from space might change the overall dynamic. It is safe to assume current JFCs would not desire CONUS-based operational control of air platforms. In fact, when air missions are flown from CONUS into an operational theater, the asset is "chopped" to the JFC at some point in the flight. It can be assumed future JFCs would desire a similar level of command and control when strikes are delivered from space assets. If that were not the case, or worse, if the JSpOC denied strike requests, a "second-class citizen" mentality in the theater could result. Over time, theater commanders might come to see space strike requests as overly complex or non-responsive. This could lead them to reduce their reliance on space assets to achieve theater effects, instead relying on in-theater air, land and sea assets when space might very well be the best operational answer.

Overall, the reachback scenario provided in current doctrine over-values asset unity of command, personnel security, and use of an existing architecture. The disadvantages of a complex command and control arrangement, the difficulties in achieving proper in-theater expertise and the negative impacts on the human aspect of leadership with the current structure can be alleviated by developing command and control from within the theater.

FUTURE SPACE COMMAND AND CONTROL

In-theater command and control of space strike negates the human aspects of leadership previously discussed. The JFC would have someone with whom to directly

³⁵ Lambeth, *Mastering Ultimate High Ground*, 126.

interface, with the capability and authority to perform the assigned mission. The space commander would also be able to directly advise the JFC on the capabilities and limitations of the on-orbit assets. In fact, once provided OPCON of the space operators, the JFC could have the ability to directly influence the chain of command designated to perform that mission. In theory, the JFC could hire (and fire) the entire staff, resulting in a more consistent and aligned working relationship.

Complete command and control of space assets in the theater is also technologically feasible. In general, any function performed by the JSpOC or any other satellite control facility can be performed anywhere on the globe, provided there are sufficient satellite over-flight windows for communication. A recent demonstration performed by the Air Force Space Battlelab proved that a field user could directly task a satellite. The user commanded an imagery satellite to take specific images, which were then provided directly back to the user.³⁶ Technology exists now to enable space command and control from within the theater.

An obvious disadvantage to in-theater command and control is the reduction of global capabilities of the space asset. If a space strike asset were to be “chopped” to the JFC, no other JFC or national user could task the satellite. To alleviate this concern, the JFC could receive OPCON during the asset’s over flight of the Joint Operational Area, similar to the CONUS-based bomber flights previously discussed. This command arrangement would produce additional command and control complexities, however, and reduce unity of command with respect to the space asset. At a minimum, the space asset would be under the control of two commanders during a single orbit. Over-tasking of the

³⁶ Conner et al., *Bringing Space Capability*, 2, 5.

satellite and reduction of the asset's lifecycle could result, assuming a finite amount of on-board weaponry or fuel for any required maneuvering.

Finally, in-theater command and control would put additional logistics considerations on the JFC. More personnel would have to be transported to the theater, requiring more support and force protection. Additional communications equipment would have to be procured, from the service component perspective, and the JFC would have to transport and establish that equipment in theater. All this leads to higher costs, as multiple in-theater space command and control centers would need to be developed and available for transport.

In order to develop in-theater command and control the JFC could establish either a Joint Force Space Component Command (JFSCC) or a Joint Force Air and Space Component Command (JFASCC). Along with the general considerations for in-theater command and control detailed above, additional considerations arise regarding the specific in-theater options.

Joint Force Space Component Command

To produce effective theater command and control, the JFC could establish a Joint Force Space Component Command, equivalent to the land, air and maritime components. See Figure 2 for a diagram of this structure.

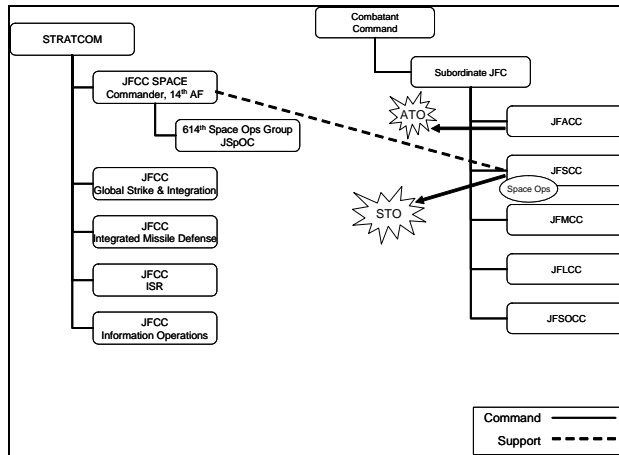


Figure 2. JFSCC Structure³⁷

The JFSCC option puts the domain-specific capabilities and limitations of space operations in the forefront, but it also reduces effects integration.

Separating the space domain into its own component enables a space-specific commander to lead those forces. It puts a space professional in charge of those capabilities, leading and integrating theater operations in and from space on a level equal to the other domains.³⁸ It also acknowledges the large amount of coordination required, and separates the space coordination and integration portion from the JFACC so no single component is over-tasked. Operating in space is governed by domain-specific physical laws, as are operations in the other domains, so the separate space component would be able to more effectively develop the theory, policy and doctrine the space domain requires.³⁹ In this manner, the JFSCC would enable effective “operational integration” of

³⁷ Basic structure for this figure derived from JP 3-14, *Joint Operations*, 3-2, with STRATCOM organizational structure derived from Scott, *Strategic Space*, and Stewart, *Unit Stands up at Vandenberg*. Inclusion of the JFSCC is that of the author.

³⁸ Harter, *Ten Propositions*, 73.

³⁹ *Ibid.*, 67.

space while maintaining the “organizational differentiation” required to improve overall space capabilities.⁴⁰

However, establishing a JFSCC could produce operational challenges for the JFC. While coordination at the functional component level would occur, a separate space component could reduce overall integration between air and space effects. With the JFSCC, no SCA within the JFACC is required and the integration is now done at the component level instead of within the air component itself. Additionally, joint doctrine recommends the component commander be from the service with the “preponderance of forces,”⁴¹ and certainly today, that would point toward an Air Force lead. Having more than one component commanders from the same service could prove troublesome for the JFC.

Joint Force Air and Space Component Command

In order to alleviate some of these concerns, the JFC could establish a JFASCC instead. This construct follows the existing architecture with the JFACC holding SCA but elevates the space portion due to the inclusion of space strike capabilities within the staff. This structure can be seen in Figure 3.

⁴⁰ Lambeth, *Mastering Ultimate High Ground*, 133.

⁴¹ JP 3-0, *Joint Operations*, 2-12.

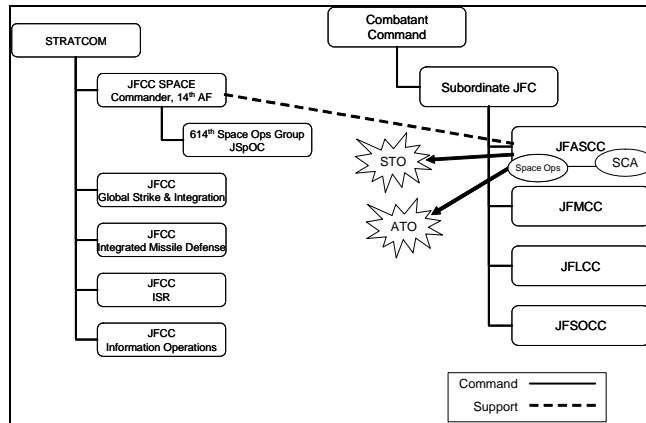


Figure 3. JFASCC Structure⁴²

The main advantages of the JFASCC are that the arrangement is already commonly understood, ensuring the highest degree of air and space integration possible. However, with the location of additional space operations forces in theater, effective command and control of both air and space forces could be difficult. In the near-term, it is also more likely for the JFASCC to have an air focus, reducing the overall effectiveness of bringing space strike to bear on the ground and eliminating the domain-specific advantages seen in the separate space component.

ANALYTIC CONCLUSIONS

One would expect the theater JFC to want as much command and control over forces involved in the effort as possible. If questioned directly, it is likely that each JFC would request OPCON of space strike operators and assets, and it has been shown that in-theater command and control of space strike is technologically feasible. However, if the JFC were convinced the same operational results would be achieved without having to deal with the logistical considerations of bringing space command and control into the theater, the JFC might very well be just as satisfied. In essence, the question comes down

⁴² Basic structure for this figure derived from JP 3-14, *Joint Operations*, 3-2, with STRATCOM organizational structure derived from Scott, *Strategic Space*, and Stewart, *Unit Stands up at Vandenberg*. Inclusion of the JFASCC is that of the author.

to whether the current framework, working from the theater through the JSpOC, can satisfy the combatant commander's requirements for space strike.

The answer to that question is no. Doctrinally and organizationally, space strike planning and execution fits well under the current reachback system. It makes sense for an SCA-holding JFACC to bring an AFSST into the JFACC staff. This construct enables the greatest amount of air and space effects integration into the theater while providing the JFACC with a staff knowledgeable of the most current and operationally relevant space capabilities. It also reduces the personnel requirements within theater, using a single space operations center (the JSpOC) to operate the forces and assets. However, the air-breathing focus of the JFACC staff, along with the human aspects of leadership, would most likely result in a reduction of focus on space strike and ineffective command and control of those space assets.

RECOMMENDATIONS: The Joint Force Space Component Command

To combat this, the JFC should establish a separate space component. This enables the warfighting commander to appropriately organize and employ space operators within the staff. In the JFSCC, the JFC dictates and establishes the staff instead of relying on the infused expertise. Continuing down the current path of infusing space expertise within air staffs will not bring the required space capabilities to bear. The current resistance to staffing such positions with well-qualified space professionals will continue until theater commanders force a change. Creation of the JFSCC constitutes such a change, and will ensure the JFC has the staff and command structure required to affect space strike as well as continue with current space support functions.

Finally, the JFSCC would be well positioned to command and control any theater-specific space capabilities. The tactical satellites mentioned previously could easily be placed under the purview of the JFSCC for command and control. Also, any coordination required for ballistic missile defense using space assets would fall under the JFSCC. While it is not feasible to wholesale transfer OPCON of the global space strike assets discussed in this paper to the JFC or JFSCC, the proposed organizational structure allows for the opportunity to enable theater space tasking directly using the “central nervous system” construct within the JSpOC. STRATCOM should transfer operational command and control of the space asset for the portion of its orbit when it could be used solely by the theater commander. In this manner, STRATCOM releases the space asset for a portion of its orbit, similar to the transitory operational command and control situations that arise with bomber flights from CONUS.

Provided a large and credible space strike capability, a JFC should establish a Joint Forces Space Component Command. This functional command will most effectively bring space expertise into the theater, while not requiring undue additional logistics considerations for the JFC. It also provides the JFC with a single, in-theater commander for space issues, effectively balancing the desire for in-theater command and control with the human aspects of leadership. The JFSCC would integrate all desired space capabilities, strike and otherwise, into the current global STO system with the JSpOC. This continues STRATCOM’s ability to weigh each JFC’s requirements with those of national leaders as well as space asset maintenance considerations.

Specifically, several actions need to occur in order to develop a JFSCC. First, joint doctrine needs to be modified to include provisions for the JFSCC. Integration and

coordination among the functional components should be specified, as well as staffing recommendations for the new command. As the executive agent for space, Air Force space command and control doctrine needs to be modified to specifically address coordination requirements between the JFSCC and the JSpOC. The SCA/DIRSPACEFOR duties and functions currently in the doctrine provide a starting point. Also, details of the specific strike capability from global assets a JFC should expect needs to be detailed to the extent possible, including any lifecycle maintenance limitations. It is also important to establish timing considerations between the STO and ATO within the doctrine. Then, these coordination and communications arrangements would need to be fully exercised. Finally, the services need to continue developing space expertise and elevating the organization, training, and equipping of their respective space cadres to the level required for effective population of the JFSCC.

SUMMARY

This paper began with a fictitious scenario in which a future JFC was able to effectively integrate strikes from space, ground, air and maritime assets. Space doctrine analysis showed that capability will not be achieved under the current structure. For effective command and control, the advantages and disadvantages of in-theater command and control using a Joint Force Space Component Command and a Joint Force Air and Space Component Command were analyzed. The JFSCC option best balances the theater commander's desires for command and control with the global requirements of space assets.

Luckily, the U.S. has time before the issue of integrating space weapons will have to be dealt with by a JFC. However, it is not too early to begin thinking about how that

integration should occur. The command and control relationships need to be developed and exercised well before the first strikes from space are performed. This paper attempted to bring to light the major concerns involved with that problem, focusing on the theater-level commander. Insights can be gained by the analysis included here, which points toward the creation of an in-theater space component command for operational command and control once space strike capabilities are present.

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